

SIXPENCE

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A SIMPLE BUT EFFECTIVE RESISTANCE AND CAPACITY

BRIDGE

(Abstracted from an article by G5sY)

The accompanying circuit shows the arrangement used by the author. An AC potential of about 50 volts (derived from one winding of a small transformer) is applied through a 1000 ohm, 5 watts safety resistor (which also acts as a voltage limiter for the lower impedances) to the ends of a 2000 ohms potentiometer, and also across the outer terminals of either two resistances, or two condensers (depending on which is being tested) arranged in series with each other. One of the latter is the component to be measured, which is connected across the terminals marked R or C. The other, which must be of known and suitable value, is selected by means of the low capacity switch shown, or connected externally across the "Match" terminals, in which case the switch must be moved to the stud marked 'M'. The extra potentiometer shown in the series with the 1 mfd standard condenser is used for power factor measurements and its use will be described later.

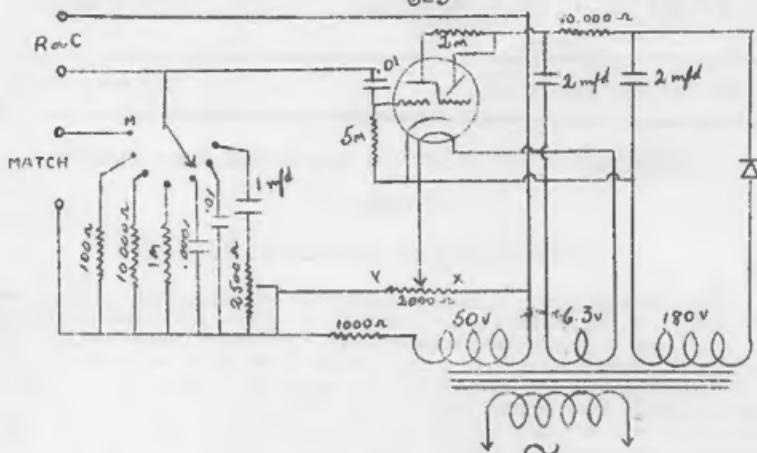
The grid of the tuning eye, a 6E5, is connected through a .01 mfd condenser to the junction between the two resistances or condensers, while the cathode is joined to the moving arm of the potentiometer. The precise type of H.T. unit used to supply voltage to the tuning eye is not important, but it is desirable to employ one producing about 200 volts.

It may be considered somewhat difficult and expensive to provide accurate standards of resistance and capacity, such as those shown connected to the selector switch, but this is not the case since it is quite unnecessary to use exactly the values quoted. What is required, however, is that the values used shall go up in multiples of approximately 100, and when purchasing the exact measured value of each should be ascertained. It will be found, however, that for all normal purposes the nominal value is all that is required.

When the slider of the potentiometer is swung during the test, it will be found that the shadow area of the 6E5 varies, the balance being indicated when this is at a maximum. If

the essential leads are kept short, particularly those from the potentiometer to the standards, and a high value of grid leak used, the point of balance should be quite critical, except perhaps on the very highest impedances.

6E5



CALIBRATION

It is necessary to calibrate the potentiometer in such a way as to indicate the ratios between the two portions X and Y (see circuit) for different positions of the slider. If the series of standards shown is used, the calibration should be carried out on either side, to beyond the points where one portion is ten times the other. It will then be possible to measure all capacities from 10 mmfd to 10 mfd, and all resistances from 10 ohms to 10 megohms. Two scales, however, must be provided, since the numbering for capacity is in the opposite direction to that for resistance.

The calibration can be carried out in various ways. The one adopted by the author was as follows:- The overall resistance of the potentiometer was first measured by means of an ordinary DC Wheatstone Bridge. One load from the measuring apparatus was then connected to the potentiometer slider. Having calculated the value of resistance required to produce the ratio sought, the slider was turned until this value was indicated and the pointer marked on a scale attached to the potentiometer.

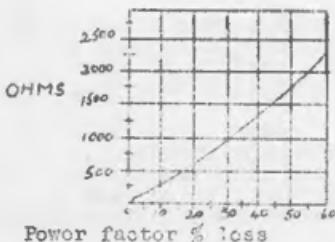
An example will perhaps make this clearer. Suppose the overall resistance to be 1950 ohms and the point for ratio $x/y = 4$ is required; then the actual resistance of the portion x should be $4/5$ of 1950 = 1560 ohms. The slider is therefore

turned until the measuring apparatus indicates this value. Proceed in this way until sufficient points have been marked. The one calibration will serve for both scales since, for example the points marked 10, 2, and .5 on the capacity scale will become .1 .5 and 2 on the resistance scale.

OPERATION

Suppose we are now ready to carry out a trial measurement of capacity. A condenser which appears to be about .01 mfd is connected to the "R or C" terminals and the selector switch placed in the .01 position. When the tuning eye is glowing fully the potentiometer is swung until balance is obtained, and the value on the capacity scale is read. Suppose this reads .85, then the actual value of the specimen is .85 of .01 or .0085 mfd. If balance should come in a very lopsided position another standard value should be tried.

When measuring large paper condensers of poor power factor it will be found that the shadow area will not open out fully. The 2500 ohm potentiometer placed in series with the 1mfd standard is used to balance out this effect, at the same time providing a simple way of measuring the power factor, by indicating the amount of resistance needed to balance the power loss. This potentiometer may be calibrated in percentages according to the graph shown -



CONCLUSION

No hard and fast rules have been laid down regarding components or particular lay-out employed, because those who wish to construct the bridge will no doubt have a number of components available. It can safely be stated, however, that the time spent on the construction will be well worth while, as an extremely useful instrument will be the result.

SPY'S TRANSMITTER

-- Details of the gear used by enemy agents --

It was recently disclosed that three enemy agents, convicted of spying, had been executed in London. Among other things found in their possession was a complete portable short wave transmitter, and representatives of The Wireless World were given facilities by the authorities to prepare a detailed description of the apparatus. For the interest of our readers we are reprinting the description of the apparatus given by the above mentioned journal.

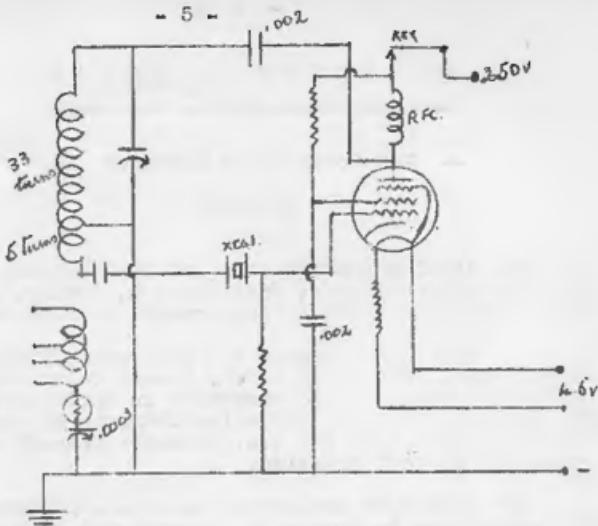
Some mild disappointment will be felt that the transmitter is not of especial technical interest, either mechanically or with regard to its circuit arrangement. The circuit is indeed, except for the use of a quartz crystal and a pentode valve, almost exactly the same as that used by a member of the staff of the Wireless World in 1924, when everything to do with the short waves was brand new, and we were all eager to get some first hand experience of their behaviour. In the matter of mechanical layout and set seems distinctly unhandy, at any rate if, as the fiction writers would have us believe, the enemy agent is always compelled to work his gear under the most difficult of conditions. A rather more finished job might have been expected from the best German technicians, and one is inclined to wonder whether the former owners of the set were, figuratively speaking, free lances, responsible for their own equipment, and merely paid by results.

As shown in the accompanying diagram, the circuit is a modified Hartly Oscillator with crystal control at the fundamental frequency of the crystal, which in the case of the transmitter described was just under 6000 Kcs.

The valve was a directly heated Telefunken battery pentode. It was used with batteries to furnish H.T. supply, and under operating conditions the anode current was 8 ma at 210 volts. Power is thus extremely low, but it must be remembered that Amateurs have often worked several hundred miles or more on even less power.

The complete equipment was carried in two black leather carrying cases with shoulder straps. The first case contained the transmitter, key and aerial equipment while the second contained the batteries and leads.

Two sets of aerials were provided, and it appears that the usual practice was to use an aerial and counterpoise, for which arrangement the circuit is suitable.



When crystal controlled the set gives a pure CW note. By removing the crystal and short circuiting the plug sockets, the transmitter could be operated as a variable frequency unit. Under these conditions stability was still of a high order, and the note, as heard on a suitable receiver with BFO, is still pure over the useful part of the tuning range.

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SILENT KEY

It is with deep regret that we announce the passing of W. M. Manley, VK2XH, on Friday, 21st of March. "Bill" -- as he was known to everyone, passed away suddenly in the very prime of life, being only 38 years of age. He leaves a widow and three small children.

He was not a newcomer to Amateur Radio by any means, as he held the call of VK2MW before it was taken by a "B" class station. He was associated with several old-timers in early experiments on 5 m, when the band was a mystery to most Hams. He was also a member of the old Leichhardt Radio Club. Of later years he was President of the newly formed Gladesville Radio Club, and his friendly personality and dry humor will be sadly missed by all his co-members of that Club.

D I V I S I O N A L N O T E S

-- New South Wales Division --

By VK2TI

The April General Meeting of the Division was held at the Y.M.C.A. Buildings, Pitt Street, Sydney, on Thursday 17th April, and quite a large number of members were present.

The Chairman welcomed two interstate visitors in Sergeant Arthur Walz, VK4AW, and L.A.C. Launce Doane VK5LD. Both these amateurs hold executive positions in their divisions prior to the outbreak of war: 4AW being Chairman of the VK4 Division, and 5LD a member of the S.A. Division Council and at one time secretary of that division.

The visits of interstate Amateurs, particularly W.I.A. Office Bearers is always of interest and does much to overcome the distance separating the various capitals, as everyone will agree it is much easier to discuss various matters personally rather than by correspondence, hence the value of the Annual conventions held in the piping days of peace. Even in those far off days one would learn per medium of "Amateur Radio" that "So and so had been on a visit to VIM and had spent several days in VIS." "So and so" had never bothered to contact any officer of the Instituto and discuss ham radio from an interstate viewpoint.

Under the present circumstances the visit of 4AW and 5LD was of value and they were enabled to discuss with VK2 councillors the future of Amateur Radio and the post war Instituto, and it is hoped that as a result of these talks a step forward has been made in meeting the position that will arise when the time comes to once more 'pound brass'. From the April issue of "Amateur Radio" we learn that the Federal President, Bill Gronow 3WG is in New South Wales. Bill, the Division would be pleased if you would contact them so that a formal welcome to VK2 could be extended to you.

During General Business the Radio Inspector's instruction "that gear should be placed in a receptacle suitable for sealing" was discussed, many members expressing annoyance that after having placed their gear in various containers they, and in many cases, wives and mothers were compelled to pull it all out again upon the arrival of the R.I.'s representative.

A very interesting demonstration of an audio amplifier was given by the Divisional Technical Officer, Jack Howes, VK2ABS and a discussion dealing with the merits of triodes and pentodes was of interest.

The next General Meeting of the Division will be held on Thursday 15th of May at the Y.M.C.A. Buildings, Pitt Street, Sydney, and a cordial invitation to all hams on service to be present is made. Messrs. McIntosh and Johnson have kindly offered to provide a demonstration of a home recording unit and members may look forward to an interesting evening.

Friends of Chas. Miller VK2ADE will regret to learn that he failed to "duck" and was the recipient of a piece of shrapnel from a German Ack Ack gun. Chas' main worry though seemed to be the loss of his portable receiver during an air raid in the town where he was convalescing.

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-- VICTORIAN DIVISION --

I'm afraid that I must start off those notes with an apology. It seems that in the notes last month the reference to SWG has been misconstrued. To clear it up Bill frequently has trips interstate and as a rule hurried, so he doesn't get much time of his own.

Well another month has flown past with the result that writing those notes is becoming somewhat of a repetition. I know what the gang who attend the meetings do, but outside that only what leaks through now and again. However, here goes:-

SYK .. was reported sometime ago to be transferring to the Navy, the most up-to-date news is that he is now with the R.A.A.F. stationed at Singapore.

SXF .. is another of the gang who is reported to be at Singapore.

SHG .. has been seen in Canterbury recently looking very fit.

SOW .. We all offer our congratulations, Gordon, on your recent engagement. What else are you doing ????

SAT .. is another we must congratulate on the arrival of a Junior op .. I wonder if you will see this Frank ???

SWD .. another member of the R.A.A.F. stationed at Cootamundra.

3RN .. has recently added to his gear in the shape of a selfishly-excited oscillator, in this case a YL op. From reports Ron has been playing around with a new type of bottle, at least to him. Its characteristics are particularly good, as it usually stops howling in the audio stages, much, we presume to Ron's relief.

3WE .. has come to light at last. Had a letter from Bill during the month. Bill is doing swell, and is to be located at Darley Camp, where he is teaching the 'young squirts' how to 'pop' 'em off.

3FR .. is now in camp with the signals, or at least we hope so. Just what camp Fred is in isn't clear as yet.

3WY .. spends most of his spare time hunting suitable articles for this mag. Wishes someone else could dig up something now and again.

3BQ .. is I learn still among the living, and hopes to put in an appearance sometime.

3XJ .. has been neglecting the garden...result...OW, QRM; but George had an excellent reason....to finish building a folded horn cabinet to improve the sound of his BC receiver. From reports it works very well, and repays the work spent on it.

3RJ .. after a long absence appeared at the last meeting. Seems to be an air of secrecy about Ray 'cause all we could get out of him was that the only excitement he had had was a day prospecting in the hills. He didn't say what hills???

3JB .. caused a sensation at the last meeting by suggesting a field night for lady ops... of course he would be the instructor.

3DH .. once again sneaked quietly in the door, and reports that "recording" still holds the main interest (I guess it always will) garden and household jobs retaining, as Ivor puts it the "rear seat." (Apparantly there's no rear seat driver.) Additions to the recording apparatus include a more effective equalizer and a means of collecting the cuttings. The recorder does a fair job at 33 1/3 rpm with very little "wow" troubles. Has promised to write an article for the mag. in the near future.

R. S. Clarkson .. one of our members without a ticket as yet, has been playing around with a new receiver trying to find what is left on the short wave bands. He is also trying out an equalizer in conjunction with a crystal pick-up the noise end of which are a pair of scarce 2A3 tubes.

3DF .. is another old-timer who turned up at the meeting.

Ben Potter .. ex second op of 3XJ is with the RAE located somewhere down the bay...From all accounts July 5th is going to be Ben's big day...or should I say the day of his misfortune?? Yes, from reports he's going to be married on that day, and it's rumoured that it's going to be in Camberwell..we'll have the band out Ben But say Ben, have you got rid of all that "HUM" yet?

The last General meeting saw rather a fair attendance roll up. The subject matter of the lecture delivered by Mr. Jack Kling, 3JB was very interesting as was proved by the lateness of the meeting and the number of questions fired at him. The subject was the printing of photos, and branched off into the subject of colour photography.

Next month at the meeting which will be held on Tuesday, June the 3rd, a demonstration with an amplifier, output meter and frequency recordings, will be the main subject of the evening. From accounts several of the gang are going to bring in various pieces of audio equipment, and their 'pot' disc, so methinks it's going to be a very interesting evening. 3DH has promised to bring in some recordings he has made of some of the boys way back when we were on the air. If you have an amplifier which you consider is the "berries" bring it in and put it through its paces.

During the month a letter was received by the Institute from Mr. H. B. White VK3IR, who is a Telegraphist on one of His Majes ty's Ships. Here is the letter:-

"Frank O'Dwyer, 30F wrote to me and suggested that I should write a few lines to you about the doings of ex hams in the parts I visit. Well first, as co-operators here we have Ken Allen, 3UH, Ged Marley 4CJ, Leo Myers 2KS, and myself 3IR. Whilst in Belfast, North Ireland, we were given a great reception by the North Ireland Amateur Radio Club, which is a part of the Radio Society of Great Britain. The Club is situated in the YMCA building in Belfast, and meetings are still held twice a week. These are always fully attended by locals as well as many Colonial and English hams on leave.. Two Americans, W1's presented themselves one night much to the surprise of everyone. I was invited to the BBC Annual Dinner for Belfast employees as representative more or less for Australia. I told the gathering of Engineers, Announcers, Radio Inspectors, etc., of the popularity of Amateur Radio in Australia, about the Institute and the magazine, about the close and happy co-operation between the Radio Inspectors Department and the Vigilance Committee. One of the Radio Inspectors afterwards asked me questions re the Vigilance system we have, and proposed forwarding same to the British G.P.O. when the time of re-opening wireless stations comes into being. The manager of Honley's Toleg Works Co. in Belfast is a Ham and gave us much assistance both socially and technically.

One afternoon at the Radio Inspector's Office, we were given

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The Division meets on the Third Thursday of each month at Y.M.C.A. Buildings, Pitt Street, Sydney, and an invitation is accorded to all Amateurs to be present.

HAMS !

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